



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,833	12/30/2003	John C. Batterton	09991-151001	9382
26161	7590	03/13/2006	EXAMINER	
FISH & RICHARDSON PC P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022			MRUK, GEOFFREY S	
			ART UNIT	PAPER NUMBER
			2853	

DATE MAILED: 03/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/749,833	Applicant(s) BATTERTON ET AL.	
	Examiner Geoffrey Mruk	Art Unit 2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 19 May 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>25 August 2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 5-7, 9, 10, 15, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Louzil (US 4,422,082).

With respect to claim 1, Louzil discloses a drop ejector (Column 1, line 10), comprising: a flow path (Column 3, lines 65-68; Column 4, lines 1-2) in which fluid is pressurized to eject drops from a nozzle opening (Fig. 6, element 2) formed in a substantially planar substrate (Column 3, lines 61-65) and lying in a plane defined by a surface (Column 3, line 64, i.e. element 3) of the substrate, and a channel (Fig. 6, element 9) formed in the substrate proximate the nozzle opening for drawing fluid into the space defined by the channel, a portion of the channel being below the plane defined by the surface of the substrate (Fig. 2, element t; Column 4, lines 29-39).

With respect to claim 2, Louzil discloses the nozzle opening is surrounded by the channel (Fig. 7, element 9).

With respect to claim 3, Louzil discloses the channel is in the shape of a circle (Fig. 7, element 9).

Art Unit: 2853

With respect to claim 5, Louzil discloses the channel has a width that is about twice the nozzle opening width or less (Column 4, lines 24-32, i.e. inner and outer diameter of the annular ring).

With respect to claim 6, Louzil discloses the channel has a width of about 100 microns or less (Column 4, lines 24-29).

With respect to claim 7, Louzil discloses a depth of the channel is from about 2 microns to about 50 microns (Column 4, lines 32-34).

With respect to claim 9, Louzil discloses the planar substrate includes a plurality of nozzle openings and channels proximate the nozzle openings (Fig. 6, array of element 2).

With respect to claim 10, Louzil discloses the nozzle opening width is about 200 microns or less (Column 4, line 9).

With respect to claim 15, Louzil discloses the channel is spaced from the nozzle opening by a distance of about 20% of a nozzle width or more (Column 4, lines 44-46, i.e. element 7 thickness).

With respect to claim 16, Louzil discloses at least one radial channel (Fig. 7, element 9).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 8 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Louzil (US 4,422,082) in view of Hawkins et al. (US 6,258,286 B1).

With respect to claims 8 and 11, Louzil discloses the drop ejector (Column 1, line 10).

However, Louzil fails to disclose the substrate is silicon material and the actuator is piezoelectric.

Hawkins discloses making ink jet nozzle plates, where the substrate is silicon material (Column 4, line 14) and the actuator is piezoelectric (Column 6, lines 66-67; Column 7, lines 1-6).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the teachings of Hawkins for the nozzle plate of Louzil. The motivation for doing so would have been "ink jet nozzles for ink jet print heads are effectively provided with simplified micromachining processes. It is particularly advantageous in the manufacture of very small or critically dimensioned ink jet nozzle plates to take advantage of silicon processing technology at all possible steps of the process" (Column 3, lines 1-5).

2. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Louzil (US 4,422,082) in view of Kobayashi et al. (US 5,898,444).

With respect to claims 17 and 18, Louzil discloses the drop ejector where "The dams thus form a coherent bearing surface around the jet nozzles, which also has a favorable effect on the capping of the jet nozzles with a capping device" (Column 2, lines 63-65).

However, Louzil fails to disclose a vacuum source in communication with the radial channel and a wicking material in communication with the radial channel.

Kobayashi discloses an ink jet type recording apparatus having a capping device where "The cap member 13 adapted to seal the black ink recording head 7 is designed as follows: A cup is formed with elastic material such as rubber, the air communication hole and ink suction hole 54 are formed therein as shown in FIG. 4, and tubular paths 57 and 58 are formed therein which are connected to connecting mouths 50 and 51 of the slider 20. In addition, an ink absorbing sheet 59 is set in the bottom" (Column 6, lines 9-15).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the teachings of Kobayashi for the ink jet printing head of Louzil. The motivation for doing so would have been "in the apparatus, negative pressure is provided by a suction pump and applied to the capping means, so that the ink is forcibly discharged from the recording head, to eliminate the clogging of the recording head" (Column 2, lines 46-50).

3. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Louzil (US 4,422,082) in view of Bentin (US 4,413,268).

With respect to claim 19, Louzil discloses the drop ejector where the space is defined by the channel (Fig. 6, element 9).

However, Louzil fails to disclose the fluid is drawn into the space defined by the channel during jetting.

Bentin discloses a jet nozzle for an ink jet printer where "The excess ink in the troughs 6 is discharged through the channels 7. This situation is shown in FIG. 6b" (Column 5, lines 19-21).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the teachings of Bentin for the ink jet printing head of Louzil. The motivation for doing so would have been "after-flow of the residual ink in the jet nozzle channel after ejection is considerably reduced, which renders it possible to considerably increase the ejection rate" (Column 3, lines 30-33).

4. Claims 12, 20, 21, and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Louzil (US 4,422,082) in view of Bentin (US 4,413,268).

With respect to claim 12, Louzil discloses a method of fluid ejection (Column 1, line 10) drop through a nozzle opening (Fig. 6, element 2) formed in a substrate (Column 3, lines 61-65) and lying in a plane defined by a surface of the substrate (Column 3, line 64, i.e. element 3) positioning a channel (Fig. 6, element 9) in the substrate proximate the nozzle opening, a portion of the channel being below the plane

defined by the surface of the substrate (Fig. 2, element t; Column 4, lines 29-39); and providing the space defined by said channel.

With respect to claim 20, Louzil discloses the channel is spaced from the nozzle opening by a distance of about 20% of a nozzle width or more (Column 4, lines 44-46, i.e. element 7 thickness).

With respect to claim 21, Louzil discloses at least one radial channel (Fig. 7, element 9).

With respect to claims 24-26, Louzil discloses the fluid (Column 3, line 68).

However, Louzil fails to disclose:

- drawing fluid into the space defined by the channel,
- the fluid is drawn into the channel by capillary forces,
- the fluid is drawn into the channel by gravity, and
- the fluid is drawn into the space defined by the channel during jetting.

Bentin discloses a jet nozzle for an ink jet printer where "The excess ink in the troughs 6 is discharged through the channels 7. This situation is shown in FIG. 6b" (Column 5, lines 19-21). Capillary action or capillarity is the ability of a narrow tube to draw a liquid upwards against the force of gravity.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the teachings of Bentin for the ink jet printing head of Louzil. The motivation for doing so would have been "after-flow of the residual ink in the jet nozzle channel after ejection is considerably reduced, which renders it possible to considerably increase the ejection rate" (Column 3, lines 30-33).

Art Unit: 2853

5. Claims 13 and 14 rejected under 35 U.S.C. 103(a) as being unpatentable over Louzil (US 4,422,082) in view of Bentin (US 4,413,268) as applied to claim 12 above, and further in view of Held (US 5,853,861).

With respect to claims 13 and 14, Louzil discloses the drop ejector of claim 1 and the method of fluid ejection of claim 12 (Column 1, line 10).

However, Louzil fails to disclose the fluid having a surface tension of about 20-50 dynes/cm, and the fluid having a viscosity of about 1 to 40 centipoise.

Held discloses "pigmented ink jet inks suitable for use with ink jet printing systems should have a surface tension in the range of about 20 dyne/cm to about 70 dyne/cm" (column 5, lines 45-49) and an "acceptable viscosity is no greater than 20cP" (Column 5, lines 49-50).

At the time of the invention, it would have been obvious for one of ordinary skill in the art to use the teachings of Held for the ink jet printing head of Louzil. The motivation for doing so would have been the "ink has physical properties compatible with a wide range of ejecting conditions" and "The inks have excellent storage stability for a long period and do not clog in an ink jet apparatus. Further, the ink does not corrode parts of the ink jet printing device it comes in contact with, and it is essentially odorless and non-toxic" (Column 5, lines 51-60).

6. Claims 22 and 23 rejected under 35 U.S.C. 103(a) as being unpatentable over Louzil (US 4,422,082) in view of Bentin (US 4,413,268) as applied to claim 12 above, and further in view of Kobayashi et al. (US 5,898,444).

With respect to claims 22 and 23, Louzil discloses the drop ejector where "The dams thus form a coherent bearing surface around the jet nozzles, which also has a favorable effect on the capping of the jet nozzles with a capping device" (Column 2, lines 63-65).

However, Louzil fails to disclose a vacuum source in communication with the radial channel and a wicking material in communication with the radial channel.

Kobayashi discloses an ink jet type recording apparatus having a capping device where "The cap member 13 adapted to seal the black ink recording head 7 is designed as follows: A cup is formed with elastic material such as rubber, the air communication hole and ink suction hole 54 are formed therein as shown in FIG. 4, and tubular paths 57 and 58 are formed therein which are connected to connecting mouths 50 and 51 of the slider 20. In addition, an ink absorbing sheet 59 is set in the bottom" (Column 6, lines 9-15).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the teachings of Kobayashi for the ink jet printing head of Louzil. The motivation for doing so would have been "in the apparatus, negative pressure is provided by a suction pump and applied to the capping means, so that the ink is forcibly discharged from the recording head, to eliminate the clogging of the recording head" (Column 2, lines 46-50).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

The examiner makes of record that the previous specification and claim objections dated 6 July 2005 are withdrawn in view of applicant's remarks.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoffrey Mruk whose telephone number is 571 272-2810. The examiner can normally be reached on 7am - 330pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on 571 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2853

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GSM
3/7/2006

GM


3/8/06
MANISH S. SHAH
PRIMARY EXAMINER